

Cannabis Use Among Female Community College Students Who Use Alcohol in a State With and a State Without Nonmedical Cannabis Legalization in the US

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ABSTRACT

Introduction: Female community college students who use alcohol may be an at-risk group for cannabis use, especially in US states with nonmedical cannabis legalization. This study examined cannabis use among this population. We tested differences in current cannabis use across a state with versus a state without (Washington vs Wisconsin, respectively) nonmedical cannabis legalization.

Methods: This cross-sectional study included female students aged 18-29 who were current alcohol users attending a community college. An online survey assessed lifetime and current cannabis use (last 60 days) via the Customary Drinking and Drug Use Record. Logistic regression tested whether community college state and demographic characteristics were associated with current cannabis use.

Results: Among 148 participants, 75.0% (n = 111) reported lifetime cannabis use. The majority of participants from Washington (81.1%, n = 77) and Wisconsin (64.2%, n = 34) reported ever trying cannabis. Almost half of participants (45.3%, n = 67) indicated current cannabis use. Among Washington participants, 57.9% (n = 55) reported current use compared to 22.6% (n = 12) of Wisconsin participants. Washington school attendance was positively associated with current cannabis use (OR = 5.97; 95% CI, 2.50-14.28, $P < 0.001$), after controlling for age, race, ethnicity, grade point average, and income.

Conclusions: High cannabis use in this sample of female drinkers – particularly in a state with nonmedical cannabis legalization – underscores the need for prevention and intervention efforts targeted to community college students.

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INTRODUCTION

College students are an at-risk population for cannabis use, with approximately 30% of 4-year college students reporting lifetime cannabis use.¹ As many as 20% of college students report past-30-day cannabis use, and almost 80% report that the substance is fairly or very easy to obtain.² Cannabis is associated with adverse health consequences, psychological impairment, and academic difficulties.³ Increased frequency of cannabis use has been associated with an increase in alcohol use and more risky sexual behaviors.⁴ These findings underscore the importance of research into risk factors associated with college students' cannabis use.

The legalization of nonmedical cannabis use could be an important influence on college students' cannabis use. Nonmedical cannabis use is legal in 18 states, and medicinal cannabis is legal in 36 states and Washington, D.C.⁵ Such state-level cannabis legalization may increase perceptions of

safety and normative approval among 4-year college students.⁶⁻⁸ Further, growing evidence suggests a link between nonmedical cannabis legalization and frequency of use.^{9,10} These findings highlight evidence of an association between nonmedical cannabis legalization and use and perceptions of the substance among college students. Thus, it is important to understand factors that may place college students at particular risk in states with legalization of nonmedical cannabis.

Demographic characteristics are associated with the use of illicit substances and marijuana.¹¹⁻¹⁶ In particular, the type of col-

lege in which a student enrolls, alcohol use, and gender could be important indicators of risk for cannabis use. Community college students are more likely than 4-year college students to report frequent cannabis use.¹⁷ However, they may have limited access to health resources, given that less than half of community colleges have campus health centers.¹⁸ Additionally, when alcohol use is combined with cannabis use, risks of harm may be heightened. Among 4-year college students, those who use both cannabis and alcohol drink more alcohol and experience more related problems, including blackouts, injuries, and drunk driving.¹⁹⁻²² Female college students may face unique risks. Early evidence suggests that females may be more sensitive to the effects of cannabis and develop problematic cannabis use more quickly.²³⁻²⁵ For female college students, cannabis use is associated with greater alcohol-related harm, even when alcohol use is held constant.²⁶ Further, in states with nonmedical cannabis legalization, female 4-year college students show greater increases in use of the substance than their male counterparts at 4-year colleges.²⁷ Female community college students who use alcohol may face heightened risks with regard to cannabis and could be particularly susceptible to effects of non-medical cannabis legalization.

Few studies have examined cannabis use among community college students.¹⁷ Specific gaps remain in our understanding of cannabis use among community college students who use alcohol and identify as female; female community college students who use alcohol may represent an at-risk group for cannabis use. Further, most studies on associations between nonmedical cannabis legalization and use have focused on 4-year college students.^{6-9,27} This study sought to understand cannabis use among female community college students who use alcohol, specifically lifetime, current, and frequency of cannabis use. We assessed differences between students in a state with and a state without nonmedical cannabis legalization, examining across demographic characteristics. As our study population is focused on alcohol users, we include an assessment of problematic alcohol use prevalence and any differences by state in problem alcohol use prevalence.

METHODS

This cross-sectional, secondary analysis used online survey data collected during a larger study of community college students' substance use and social media use. The study received approval from the University of Wisconsin Health Sciences Institutional Review Board and the 5 participating community colleges.

Setting

This study took place at 5 community colleges: 2 in Washington and 3 in Wisconsin. Similar to previous research, we defined a community college as a post-secondary school offering 2-year degrees.^{28,29} Data were collected between March 2018 and December 2019.

Subjects

Individuals met eligibility criteria for the larger study if they were enrolled in a community college, 18-29 years old, English-speaking, a Facebook account owner (with at least monthly use), and a current alcohol user (within the last 28 days) with at least 1 episode of heavy episodic drinking (4+/5+ drinks female/males) in the past year. Students were excluded from the larger study if they were enrolled in community college courses prior to high school graduation. For this secondary analysis, only female-identifying students were included.

Recruitment and Survey Procedures

Recruitment strategies for this secondary analysis study were the same as those used in the larger study. These recruitment strategies were developed in partnership with each community college site in order to respect local rules and preferences, as well as to use approaches associated with successful past recruitment efforts. These strategies included combinations of 3 recruitment approaches. First, we shared information about the study on community colleges' websites. Second, established community college listservs were used to distribute a maximum of 3 emails with information about the study to current students. Finally, study flyers were displayed at public sites on the community college campuses. Interested students were directed to complete an online eligibility screening survey, and eligible, prospective participants were invited to complete an online consent process. Following the consent process, participants were invited to complete an online survey. The survey took 45 to 60 minutes, and participants received a \$20 check incentive upon completion.

Measures

Cannabis Use. The validated Customary Drinking and Drug Use Record (CDDR) was utilized to assess participants' cannabis use.³⁰ To assess lifetime cannabis use, this instrument asked participants to indicate whether they had ever used the substance (yes or no) and to enter the approximate number of times (open-ended response options). For current cannabis use, participants were asked to indicate whether they used cannabis in the last 60 days and to enter the approximate number of times. Responses for number of times (open-ended response options) were recoded to yes (any use) or no (no use).

Alcohol Use. The Alcohol Use Disorders Identification Test (AUDIT) is a validated 10-item self-administered screening instrument for hazardous and harmful alcohol consumption.³¹ The AUDIT indicates alcohol consumption, drinking behavior, and alcohol-related problems. Responses to each item are scored from 0 to 4, yielding a maximum possible score of 40. A score of less than 7 suggests low-risk consumption, while 8 to 14 suggests hazardous consumption, and 15+ indicates possible alcohol dependence. The validated AUDIT-C, or the AUDIT-Consumption, which focuses on general use of alcohol, also was

used. This instrument consists of 3 items of the full-scale AUDIT and assesses frequency of drinking, typical drinks consumed on a drinking day, and frequency of heavy drinking.³² Responses to each of these 3 items are scored from 0 to 4, yielding a maximum possible score on the AUDIT-C of 12. A score of 4 for males or 3 for females suggests that drinking may be affecting one's health or safety. Both overall AUDIT scores and AUDIT-C scores were analyzed.

Demographic Information. Demographic information included age, race, ethnicity (Hispanic or not Hispanic), community college state (Wisconsin or Washington), most recent grade point average, and annual income. For most recent grade point average, participants were asked to choose from a list of grade point range options, from 0.0-0.5 to 3.6-4.0. For annual income, participants were asked to choose the appropriate range from a Likert scale spanning from less than \$2,000 per year to more than \$100,000 per year.

Analysis. Descriptive statistics were summarized as frequencies, percentages, and means. For analyses, given limited demographic diversity, we coded race into 2 categories: White and all other races. Multiple logistic regression was conducted to test whether community college state was associated with current cannabis use after controlling for demographic information. All analyses were conducted using SPSS 27. All *P* values were 2-sided, and *P*<0.05 was used to indicate statistical significance.

RESULTS

Out of 726 students who completed the eligibility screening survey, 254 met eligibility criteria for the main study, and 187 enrolled. Out of 172 who completed the online survey, 148 identified as female and were included in analyses. Among these 148 participants, 76.4% identified as White/Caucasian, and 64.2% reported attending a community college in Washington. The average age was 22.89 years (SD=3.31) with a range of 18 to 29. For full demographic information, see Table 1. The mean AUDIT score was 8.05 (SD=5.66), and the mean AUDIT-C score was 4.16 (SD=2.08). The mean AUDIT score for Wisconsin students was 7.54 (SD=5.23), and for Washington students, the mean was 8.34 (SD=5.90). Mean AUDIT-C scores were 4.55 (SD=2.16) for Wisconsin students and 3.95 (SD=2.02) for Washington students. Independent samples *t* test indicated there were no significant differences in overall AUDIT ($t(146) = -0.81, P = 0.41$) or AUDIT-C ($t(146) = 1.69, P = 0.094$) scores between participants from Washington and Wisconsin.

Three-quarters (75.0%, *n*=111) of participants reported cannabis use at least once in their lifetime. These participants reported using cannabis an average of 136.11 times (SD=210.49). Approximately 81.1% (*n*=77) of participants attending a Washington community college reported lifetime cannabis use, and they reported ever using cannabis an average of 120.85 times

Table 1. Demographic Information for Female Community College Participants From Two States, *N*=148

| | Number (%) |
|---|-------------|
| Race | |
| White/Caucasian | 113 (76.4%) |
| Other | 9 (6.1%) |
| Asian or Asian American | 6 (4.1%) |
| American Indian/ Alaska Native | 3 (2.0%) |
| Black or African American | 3 (2.0%) |
| Multiracial | 3 (2.0%) |
| Native Hawaiian or Other Pacific Islander | 1 (0.7%) |
| Did not report | 10 (6.8%) |
| Ethnicity | |
| Non-Hispanic/Non-Latino | 108 (73.0%) |
| Hispanic/Latino | 38 (25.7%) |
| Missing | 2 (1.4%) |
| Community college state | |
| Washington | 95 (64.2%) |
| Wisconsin | 53 (35.8%) |
| Most recent grade point average | |
| 3.0 or greater | 109 (73.6%) |
| 2.0-2.9 | 33 (22.3%) |
| 1.0-1.9 | 5 (3.4%) |
| 0.0-0.9 | 1 (0.7%) |
| Annual income | |
| Less than \$2,000 | 15 (10.1%) |
| Between \$2,001 and \$5,000 | 17 (11.5%) |
| Between \$5,001 and \$10,000 | 21 (14.2%) |
| Between \$10,001 and \$15,000 | 25 (16.9%) |
| Between \$15,001 and \$25,000 | 30 (20.3%) |
| Between \$25,001 and \$50,000 | 34 (23.0%) |
| Between \$50,001 and \$75,000 | 3 (2.0%) |
| Between \$75,001 and \$100,000 | 1 (0.7%) |
| More than \$100,000 | 1 (0.7%) |
| Did not report | 1 (0.7%) |

(SD=174.89). Among participants attending a Wisconsin community college, 64.2% (*n*=34) reported use of cannabis at least once in their lifetime; these participants reported ever using cannabis an average of 83.66 times (SD=163.96).

Current Cannabis Use

Across all participants, 45.3% (*n*=67) reported current cannabis use, with an average of 6.54 times (SD=9.44) in the last 60 days. Over half of participants attending a Washington community college (57.9%, *n*=55) reported current cannabis use, and they indicated an average of 6.54 (SD=9.44) times using the substance in the last 60 days. Among participants attending a Wisconsin community college, 22.6% (*n*=12) reported current cannabis use; these participants reported using the substance an average of 1.81 (SD=5.96) times in the last 60 days. Lifetime cannabis use was not significantly correlated with the AUDIT-C score ($r(148) = -0.02, P = 0.77$) or the full AUDIT score ($r(148) = 0.07, P = 0.41$).

The logistic regression analysis (Table 2) showed a significant association between community college state and cannabis use

in the last 60 days. Results showed that Washington students had a greater odds of reporting current use than Wisconsin students (OR=5.97; 95% CI, 2.50-14.28, $P<0.001$). Age, ethnicity, race, grade point average, and annual income were not found to be significantly associated with current cannabis use.

Table 2. Summary of Logistic Regression of Characteristics Associated With Past 60 Day Cannabis Use (N=148)

| Predictor | β | SE | Odds Ratio | 95% CI | P value |
|-------------------------|---------|------|------------|------------|---------|
| Age | -0.08 | 0.06 | 0.92 | 0.82–1.05 | 0.21 |
| Ethnicity | 0.41 | 0.51 | 1.51 | 0.55–4.10 | 0.42 |
| Race | 0.39 | 0.54 | 1.48 | 0.51–4.29 | 0.47 |
| Grade point average | 0.05 | 0.18 | 1.05 | 0.73–1.51 | 0.78 |
| Annual income | 0.16 | 0.11 | 1.17 | 0.94–1.46 | 0.16 |
| Community college state | 1.79 | 0.45 | 5.97 | 2.50–14.28 | <0.001 |

DISCUSSION

This study addressed gaps in the literature around the use of cannabis by community college students, namely those who use alcohol and identify as female. Differences in cannabis use between students in a state with and without legalized nonmedical cannabis use were examined. Findings suggest that current (past 60 days) use of cannabis is relatively common among female community college students who use alcohol, with more students reporting current use in a state with nonmedical cannabis legislation compared to a state without nonmedical cannabis legislation.

Lifetime cannabis use was common in the sample; approximately three-fourths of students had tried cannabis at least once. This is higher in comparison to past research reporting nearly half of 4-year college students with lifetime use but is consistent with previous research suggesting associations between college students' alcohol and cannabis use.^{4,19} Further, we found that almost half of our sample of female community college students who reported alcohol use also reported current cannabis use. This finding is important given previous studies have found that more frequent cannabis use is more harmful, such as a study that found that daily users of cannabis exhibit more characteristics of dependency compared to lifetime or infrequent users.³³ A previous study of 4-year college students found that approximately 20% reported current use, comparatively lower than observed in the current study.² However, this study was of a broad population of college students across the US. This study's findings of comparatively high lifetime and current cannabis use suggest that female community college students who use alcohol are an at-risk group for cannabis use.

The study's main finding was that the most salient predictor of current cannabis use was community college state, with Washington students more likely to report current use compared to Wisconsin students. Washington has legalized nonmedical cannabis use; this may be a contributor to the higher lifetime and current cannabis use among those female community college students. One possible explanation for our findings may be the shifting perceptions of safety and harm around cannabis use. Studies have shown that only about a third of young adults think cannabis use places the user at risk, compared to over half a decade ago.² These perceptions may be particularly strong in states that have legalized nonmedical cannabis use. One study found that for some college students, legalization of nonmedi-

cal use is associated with perceptions that cannabis use is safe or even endorsed "by the government."⁷ Thus, the current study's findings suggest that nonmedical cannabis legalization could be associated with higher use of cannabis among female community college students who use alcohol. However, another possible explanation is differences in cannabis use between the two states before cannabis legalization.

Limitations

Limitations of this study include that our recruitment criteria were targeted to identify current Facebook users because of the focus of the larger study, and the current sample is relatively small. While it is possible that our findings do not generalize to non-Facebook users, previous work has found that, at the time of this study, over 80% of young adults used the platform.³⁴ Another limitation is that because of the recruitment strategy used by the larger study—via campus websites, flyers, and listserv emails—a response rate could not be calculated. Additionally, there was a lack of racial and ethnic diversity in the study sample. Future research should examine effects of cannabis legalization on community college students identifying with specific racial and ethnic groups. Further, the current study focused on community college students who identified as female, reported alcohol use, and were from one of two states. The risk associated with cannabis use for other groups of community college students remains unclear. Cannabis use behaviors, in particular, may differ for a general sample of community college students who do not drink alcohol.

Nevertheless, our study included participants from 5 campuses and adds to the scant literature on cannabis use among community college students, particularly the potentially at-risk group of female community college students who use alcohol. Additionally, given that Washington, but not Wisconsin, currently has a non-medical cannabis law for adults 21 and older, self-report of cannabis use may be associated with greater stigma in Wisconsin than in Washington. It is possible that students from Wisconsin underreported cannabis use compared to those from Washington. It is also possible that underage participants underreported their cannabis or alcohol use. A further limitation is that involved community colleges were not systematically selected to represent urban and rural settings. Future studies should examine the generalizability

of findings across urban and rural campus settings. Finally, causal associations cannot be inferred from this cross-sectional study.

CONCLUSIONS

This study's finding that current cannabis use was more likely among community college students from a state with legal non-medical cannabis than one without highlights important implications. Cannabis prevention, screening, and treatment may be of particular importance at community colleges in states with nonmedical cannabis legalization. Given that nonmedical cannabis legalization was associated with higher use among community college students, future studies should examine mechanisms underlying this relationship, such as shifting norms or perceptions of safety. Further, cannabis use in states that have legalized cannabis may be associated with use of other substances as well as being of legal age, and future studies should explore these relationships. Such studies could inform development of prevention messages around influential factors for cannabis use among community college students in states with nonmedical cannabis legalization.

Our findings highlight the need to provide prevention and intervention approaches for female community college students who use alcohol, given that cannabis use behaviors may be problematic for some students. Cannabis prevention, screening, and treatment approaches targeting community college students who use alcohol may be important to consider toward preventing harm associated with cannabis use and cannabis-alcohol co-use. These efforts may be of particular benefit to female community college students who use alcohol but could assist in mitigating cannabis-related harm for all community college students. As most community colleges do not have onsite campus health centers, novel approaches are clearly needed.¹⁸ A previous study found that many community college campuses have an online or social media presence.³⁵ Thus, it is possible that prevention education or screening and referral could leverage those online resources. For example, prevention messages could be delivered through community colleges' social media profiles.

Funding/Support: Data collection and manuscript preparation were supported by the National Institute on Alcohol Abuse and Alcoholism grant R34AA025159 awarded to M.A. Moreno and M. A. Lewis.

Financial Disclosures: None declared.

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